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R. O. STEARNS ET AL

CONDENSER FOR STEAM DRIVEN MACHINERY

Filed June 28, 1920

Fig. 1.

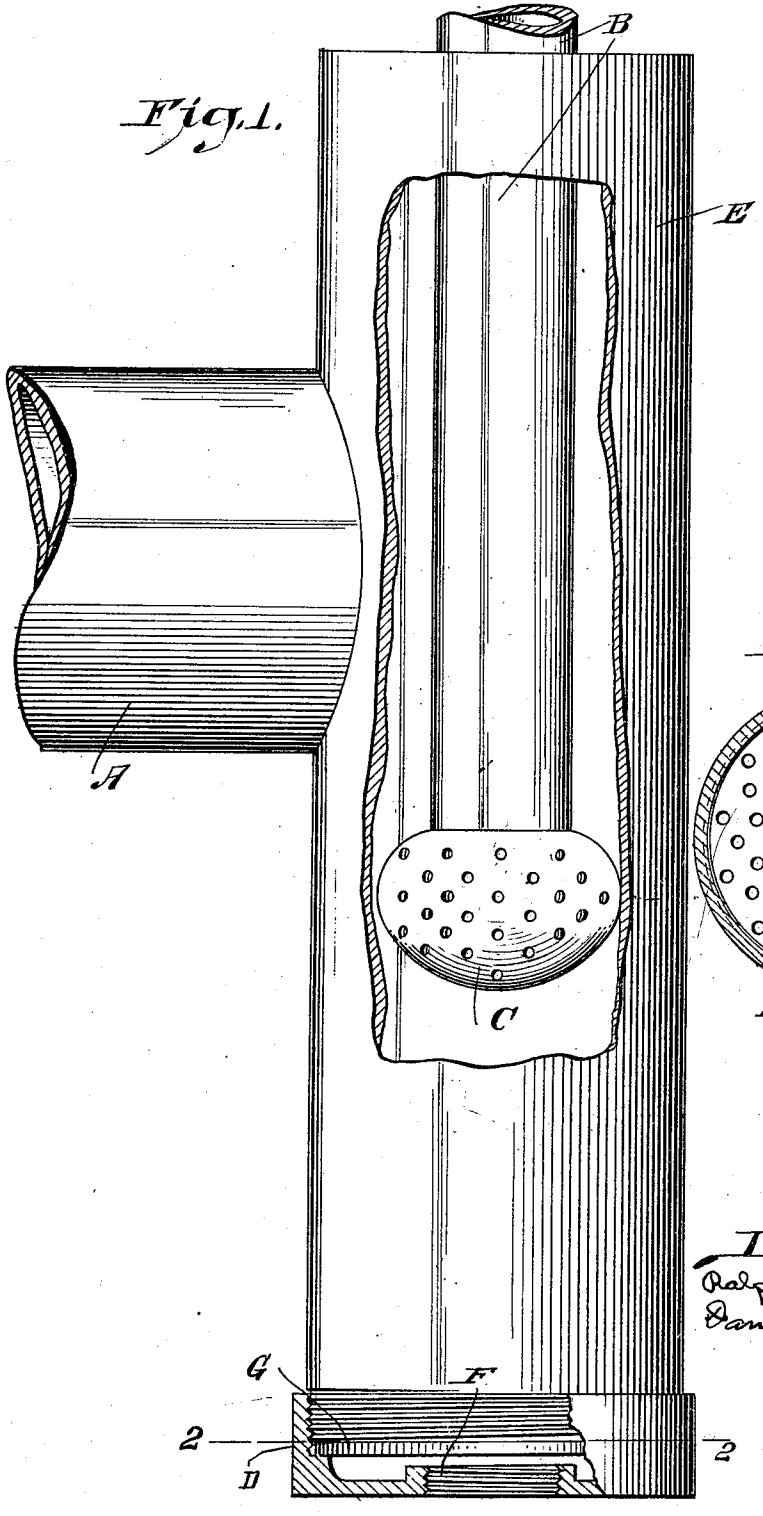
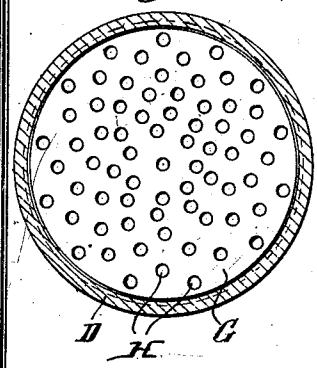


Fig. 2.



Inventor:
Ralph O. Stearns,
Daniel E. McKeon

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UNITED STATES PATENT OFFICE.

RALPH O. STEARNS, OF WINTHROP, NEW YORK, AND DANIEL E. McGRAW, OF CRESSKILL, NEW JERSEY.

CONDENSER FOR STEAM-DRIVEN MACHINERY.

Application filed June 28, 1920. Serial No. 392,505.

To all whom it may concern:

Be it known that we, RALPH O. STEARNS and DANIEL E. McGRAW, citizens of the United States, residing, respectively, at Winthrop, in the county of St. Lawrence, State of New York, and Cresskill, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Condensers for Steam-Driven Machinery, of which the following is a description, reference being had to the accompanying drawings, and to the figures of reference marked thereon.

This invention relates to condensers for steam driven machinery, and more particularly to that type of condenser in which the steam is condensed by being brought into intimate contact with a spray or jet of water.

The main object of this invention is to provide a condenser of the character above described wherein the condensation of the steam creates a vacuum in the condensing chamber thereby eliminating back pressure in the steam exhaust conduit.

A further object of this invention is to provide a condenser of the type described in which the water used for condensing the steam and the water of condensation are utilized to provide a water seal for the condenser outlet, said outlet being constructed and arranged to permit the water to escape without the ingress of air and in quantities sufficient to maintain the water seal without the accumulation of excess water within the condensing chamber.

A further object of this invention is to provide a simple condenser of the type described adapted to be readily attached to the exhaust of steam driven machinery and the like.

These and other objects will in part be obvious, and will in part be hereinafter more fully disclosed.

In the accompanying drawing, Figure 1 illustrates one form of the improved condenser with the parts broken away showing the interior construction. Figure 2 is a section on line 2—2 of Fig. 1.

Referring more particularly to the drawing, the condenser preferably comprises a cylindrical casting E provided with an integral conduit A adapted to be connected to the steam exhaust of any steam discharge, but preferably to the steam exhaust of a milk separator turbine for which the present condenser has been especially designed, inasmuch as in steam driven turbines, it is essential that the steam be condensed without the creation of a back pressure. Preferably at its top, the cylindrical casting is provided with a water inlet B which may be, if desired, either integral or separably connected as by screw threads or in any desired manner. This pipe B depends into the casting and is provided with means for spraying the water into the steam flowing into the cylinder by way of the conduit A. These perforations may be either arranged directly in the conduit B itself, or may be formed in the cap C closing the open end of this pipe B. The lower end of the cylindrical casting is closed by a cap D which may be screw threaded if desired on the end; may be cast integral with the casting, or connected in any well known manner. This cap D is provided with an opening F. for the discharge of the condensed water and also a strainer plate G having the perforations H, which plate is clamped in position when the cap D is threaded on the lower end of the cylindrical casting E. The size of the apertures H in this plate G are of such proportions that their combined capacity approximates the normal amount of spray water entering through the pipe B, plus the water of condensation from the steam flowing in through the pipe A.

In the operation of the above device, sufficient water is first permitted to flow through the pipe B which obviously is controlled by a valve of any desired type, to provide a reservoir or accumulation of water in the cylinder to cover the apertures H to provide a water seal therefor. In other words, more water is allowed to flow through the pipe B than can escape through the perforations of the cap D. The steam is then permitted to come through the connection A from the steam exhaust and is condensed by the water sprayed through the nozzle C. In view of the fact that the discharge apertures H of the casting are sealed by the body of water within the cylindrical casting, it is obvious that no air can enter the cylinder through these perforations, so that as the steam within the cylinder is condensed, a vacuum is formed, which is at once maintained by the water seal at the discharge apertures H. The discharge of water through the conduit B is then regulated so that the amount dis-

charged therethrough, plus the water of condensation from the steam turbine separator exhaust through the pipe A is substantially equal to the amount of water discharged through the apertures H in the cap D inasmuch as there was formed in the bottom of this cylinder, a preliminary body of water to seal the apertures H, and inasmuch as this body of water will not be substantially diminished or increased after the condenser begins to function, it is clear that the seal will be automatically maintained and the water spray discharge and steam condensation discharge will be permitted to escape from the condenser.

From the foregoing it will be seen that a device of the present type is very simple in construction and most effectively condenses the steam without the creation of a back pressure while, at the same time, muffling the escape of the exhaust and preventing its discharge into the atmosphere, which heretofore has been objectionable.

It is obvious that minor changes in the details of construction may be made without departing from the spirit of the invention as set forth in the appended claims.

1. A device for condensing steam without creating a back pressure comprising a closed chamber provided with a steam inlet, means for introducing water into said chamber to condense the steam therein, a discharge for said chamber constituting the sole outlet for said steam, said discharge being constructed and arranged to maintain a body of water in said chamber covering said discharge whereby a vacuum is formed within said chamber due to the condensation of the steam.

2. A device of the character described comprising a closed chamber having a steam inlet, means for introducing water into said chamber to condense the steam therein, an outlet for said chamber constituting the sole outlet for said steam, said discharge being constructed and arranged to permit the discharge of water and products of condensation from said chamber while preventing the entrance of air therethrough whereby the vacuum is formed and maintained within said chamber by the condensation of the steam.

3. A device of the class described comprising a closed chamber provided with a steam inlet, means for spraying water into said chamber, an outlet for said chamber located at a point at which the water in the chamber collects constituting the sole outlet for said steam, said outlet being submerged by said water and having a discharge capacity substantially equal to the normal inflow of water plus the water of condensation.

4. A device of the character described comprising a casting having a connection to a steam discharge, a water spray pipe connected to said casting and depending thereinto in position to spray the steam, said casting having a perforated portion located below the water spray and adapted to discharge water therethrough while preventing the ingress of air into said casting.

5. A device of the character described comprising a closed chamber having a connection with a steam exhaust, means for spraying water into said steam within the chamber, means for automatically permitting the discharge of said water plus the water of condensation, said means maintaining a vacuum within said chamber caused by the condensation, of the steam therein.

RALPH O. STEARNS.
DANIEL E. McGRAW.